

REMARKS

I. Introduction

In response to the pending Office Action, Applicants have amended claim 1 to correct informalities in the claim language. No new matter has been added.

Applicants respectfully submit that all pending claims are patentable over the cited prior art for the reasons set forth below.

II. The Rejection Of Claims 1-9 Under 35 U.S.C. § 112

Claims 1-9 are rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. Applicants respectfully submit that the amendment made to claim 1 overcomes this rejection.

III. The Rejection Of Claims 1-9 Under 35 U.S.C. § 103

Claims 1-9 are rejected under 35 U.S.C. § 103(a) as unpatentable over Matsuba et al. (WO 02/035554, hereinafter Matsuba). Applicants respectfully submit that Matsuba fails to render the above cited claims obvious for at least the following reasons.

The Examiner asserts, referring to paragraph [0093] of Matsuba, that Matsuba discloses the content of the glass frit is in the range of 0.1 wt % to 15 wt % to the total amount of the glass frit and the metal powder, and further asserts that any minor modifications necessary to meet the claimed limitation are well within the purview of the skilled artisan. It is, however, noted that paragraph [0093] of Matsuba states:

The **content of these resin components** contained in the varnish-like resin composition may be selected as appropriate according to the total bulk of the ultrafine metal particles and the proportion of gap spaces present among these particles. In general, **its content** is

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selected from a range of 1 to 30 parts by weight, preferably of 3 to 20 parts by weight, based on 100 parts by weight of the ultrafine metal particles.

Emphasis added. What is disclosed here is the content of the resin components, but not the content of the glass frit. In Matsuba, the resin component is a main component in the vanish-like resin composition (see, first four lines in paragraph [0092] of Matsuba) and means an organic binder such as thermosetting resin, thermoplastic resin or thermally decomposable resin, which are all organic materials (see, paragraph [0092] of Matsuba). On the other hand, the glass frit which may be used as an additional component to the vanish-like resin composition cannot be a resin component. As such, Matsuba fails to teach or even suggest the content (amount) of glass frit being in the range of 0.1 wt % to 15 wt % to the total amount of the glass frit and the metal powder, as recited by claim 1.

As is well known in patent law, in order to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested. As Matsuba fails to disclose an electrically conductive paste comprising main components including a metal powder, a glass frit, and an organic vehicle, wherein the content of the glass frit is in the range of 0.1 wt % to 15 wt % to the total amount of the glass frit and the metal powder, it is clear that Matsuba fails to render claim 1 obvious. Therefore, it is respectfully requested that the rejection of claim 1 under § 103 be withdrawn.

Applicants further note that although it appears that Matsuba discloses a use of the glass frit in paragraph [0092], the glass frit is only disclosed as an additive, and Matsuba fails to disclose amounts of the glass frit to be added (or size of the glass frit as recited by claim 9). In contrast, in the present application, a glass frit is one of the main components of the electrically conductive paste as recited by claim 1. Thus, in the present application, the glass frit having the amount of 0.1 wt % to 15 wt % to the total amount of the glass frit and the metal powder is used

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to provide the sufficient adhesion between the conductive paste and the substrate while providing sufficient conductivity of the paste, and to decrease the residual stress of the film and also to enhance both the applicability and adhesion of the thick film to the substrate (see, paragraphs [0025]-[0026] of the present application). Therefore, to meet the amount of the glass frit with the claimed amount of the glass frit used as one of the main components is not a minor modification within the purview of the skilled artisan.

As such, Applicants respectfully request that claim is not obvious over Matsuba because there is no suggestion or motivation to use the glass frit as a main component and to meet the content of the glass frit with the amount of 0.1 wt % to 15 wt % to the total amount of the glass frit and the metal powder, as required by claim 1. Therefore, it is respectfully requested that the rejection of claim 1 under § 103 be withdrawn for this reason in addition to the reasons set forth above.

Applicants further note that Matsuba discloses that the material provides a low temperature sintering conductive paste, specifically the heat treatment temperature is selected to be 300°C or lower, preferably 250°C or lower, generally 180°C to 230°C (see, Abstract, paragraph [0099] and Examples in Matsuba). Further, Matsuba discloses that the resin component acting as an organic binder is selected from thermosetting resins, thermoplastic resins or thermally decomposable resins. However, an organic binder that can be decomposed at a temperature of around 200°C does not exist. The organic binders of Matsuba would remain in the heat-cured product after the sintering process. Thermosetting resins such as phenolic resin are exemplified by Matsuba do not decompose at the heat treatment temperature of Matsuba.

To realize such a low-temperature sintering, in Matsuba, the surface of the ultrafine metal particles is covered by molecular layer to contribute to retention of a stabilized colloidal state.

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The molecular layer covering the surface can be effectively removed during the process of curing a low-temperature curable organic binder by heating (paragraph [0013] of Matsuba). In other words, the material of Matsuba requires a compound (A) having a group containing a nitrogen, oxygen or sulfur atom and capable of coordinate-bonding by lone pairs existing in these atoms as a group capable of coordinate-bonding to a metal element contained in the ultrafine metal particles, and a compound component (B) having reactivity with the group containing a nitrogen, oxygen or sulfur atom as for the compound which has the group containing the nitrogen, oxygen or sulfur atom when heated (paragraphs [0020] and [0022] of Matsuba).

In contrast to Matsuba, the sintering temperature of the present application is 450°C or 500°C (see, Examples in the Specification). The present application uses a cellulose resin or an acrylic resin as the organic vehicle. When heated in the above temperature range, the resin would decompose and would not remain in the heated product, thereby providing a high conductivity. The Examples in the description show that the resistivity of the samples is in the range of 2.0 to 5.3 $\mu\Omega\text{cm}$, which is close to the bulk metal values. In contrast, the resistivity shown in Matsuba was in the range of 6.5 to 8.4 $\mu\Omega\text{cm}$ (see, Table 1-1 of Matsuba).

Furthermore, the subject matter of claim 1 does not need such a compound component (B) having reactivity with the group containing a nitrogen, oxygen or sulfur atom as Matsuba does. The main components of the claimed invention are a metal powder, glass frit, and an organic vehicle containing a cellulose resin or an acrylic resin. Thus, the claimed invention realizes lower resistivity than that of Matsuba.

As such, Applicants respectfully request that claim 1 is not obvious over Matsuba because there is no suggestion or motivation to modify the selection, the amount or the size of the components of the electrically conductive paste to meet the limitations of claim 1. Therefore,

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it is respectfully requested that the rejection of claim 1 under § 103 be withdrawn for at least this reason in addition to the reasons set forth above.

IV. All Dependent Claims Are Allowable Because The Independent Claim From Which They Depend Is Allowable

Under Federal Circuit guidelines, a dependent claim is nonobvious if the independent claim upon which it depends is allowable because all the limitations of the independent claim are contained in the dependent claims, *Hartness International Inc. v. Simplimatic Engineering Co.*, 819 F.2d at 1100, 1108 (Fed. Cir. 1987). Accordingly, as claim 1 is patentable for the reasons set forth above, it is respectfully submitted that all pending dependent claims are also in condition for allowance.

V. Conclusion

Having fully responded to all matters raised in the Office Action, Applicants submit that all claims are in condition for allowance, an indication of which is respectfully solicited.

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To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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